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ABSTRACT

Teachers use a variety of teaching strategies or models so that a range of educational environments will be available to meet the variety of student needs. A model for matching these teaching strategies to students in terms of their learning style is described and its construct validity is discussed. Principles of matching according to variation in conceptual level form the basis for this model. Coordination of teaching strategies with this conceptual level matching model requires that techniques be described in terms of their degree of structure. Problems in the implementation of thi plan are noted and educational arrangements which are best suited to meet specific student needs are discussed. It is concluded that the student's learning style is only one of many characteristics which can be matched to variation in educational approach. (SHM)

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Learning styles and teaching strategies

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Bruce Joyce has just described how teachers acquire models of teaching, or teaching strategies, so that a range of educational environments will be available to meet the variety of student needs. I will describe a model for matching these teaching strategies to students in terms of their learning style, a matching model intended to take seriously the issue of student needs so that they can be met more effectively. After describing the matching model and its supporting construct validity, a variety of educational arrangements for implementation of matching are considered, and some issues raised by such implementation discussed.

Conceptual Level matching model

To be helpful to teachers, a developmental theory should specify the educational needs of students at different levels of development, and should distinguish between the student's immediate needs (contemporaneous) and his long-term requirements for growth (developmental). The Conceptual Level matching model (Hunt, 1971) describes students both in terms of their stage and their present orientation or style so

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the appropriate environments can be specified both for developmental and contemporaneous purposes. For example, a student might be at a dependent, conforming stage of development (or contemporaneous orientation). In dealing with such a student, a teacher may take account of his contemporaneous orientation to plan the immediate educational environment likely to be most effective. The teacher may also bear in mind that efforts should be directed in the long run to the developmental goal of increasing the student's independence.

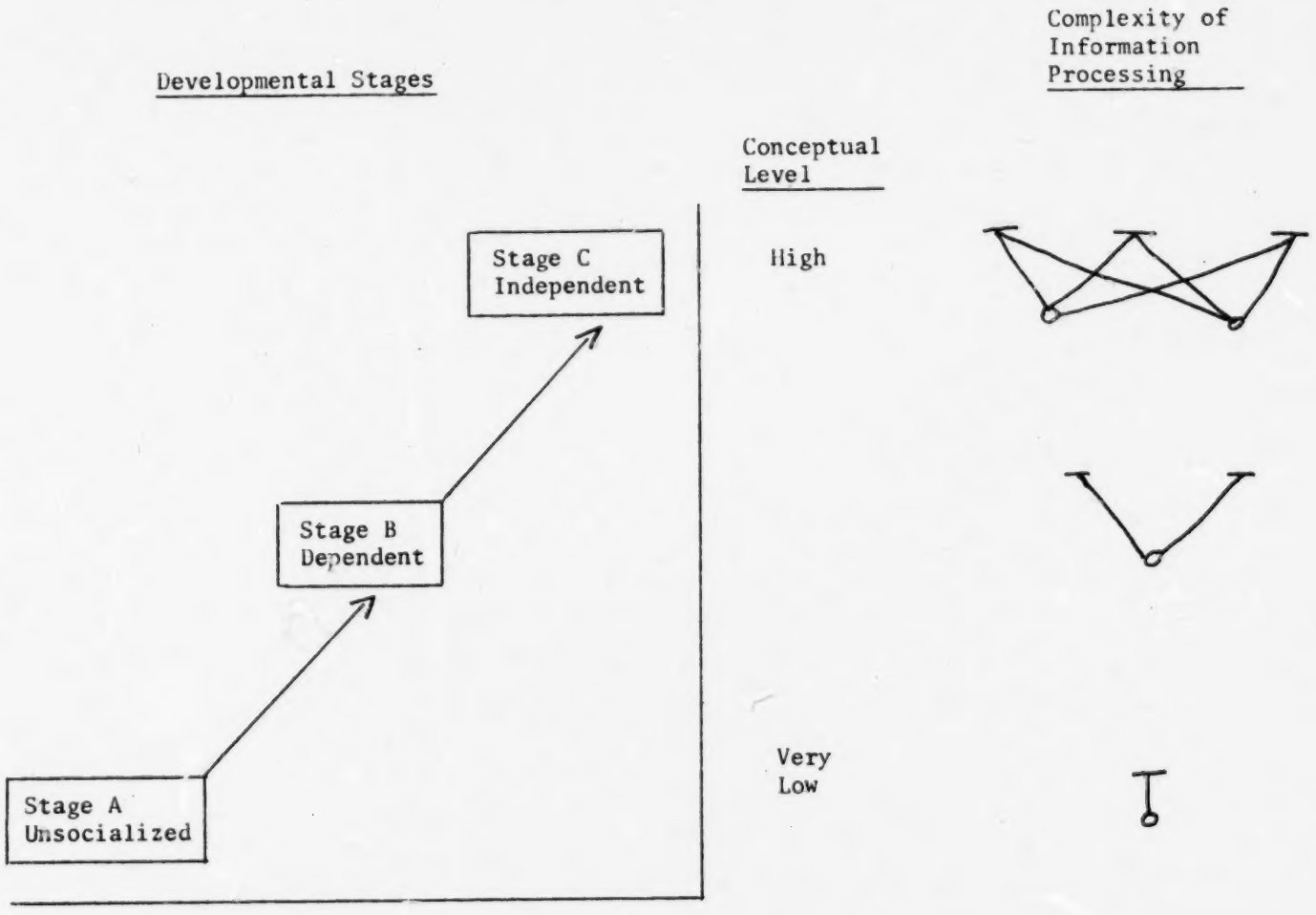
Conceptual development is viewed on a dimension of conceptual complexity or interpersonal maturity. Although development is (under ideal conditions) continuous, this process can best be described in stages or segments, much as a motion picture sequence could be represented by selecting still shots from the sequence.

Insert Figure 1 about here

The sequence of stages can be telegraphically summarized (see Figure 1) as proceeding from an immature, unsocialized stage (A) to a dependent, conforming stage (B) to an independent, self-reliant stage (C). The diagram on the left side of Figure 1 is intended to represent this development. From a developmental view, the stages can be described in terms of increasing interpersonal maturity and increasing understanding of oneself and others.

Figure 1

Variations in Conceptual Level



From Hunt, D. E. & Sullivan, E. V. Between psychology and education, Hinsdale, Illinois: Dryden. In press.

Progression from Stage A to Stage B requires the conceptual work of defining the external boundaries and learning the generalized cultural standards which apply to both self and others. This learning of rules and roles is the basic assimilation of cultural norms and expectations.

This general standard incorporated in Stage B serves as the anchoring basis for the self-defining work in progressing to Stage C. Self-definition occurs through a process of breaking away from the standard developed in Stage B. Learning about how one is distinctively oneself provides the basis for beginning to accept individual responsibility for outcomes. Stage C independence may appear initially in exaggerated form, but is nonetheless the person's first awareness of his own feelings as cues for differential action.

As Figure 1 indicates, variation in Conceptual Level (CL) is also characterized by the complexity of information processing, or conceptual complexity. For example, the Stage B person differs from the Stage C person not only in being more dependent but also in being less conceptually complex.

Matching prescriptions

The Conceptual Level developmental model is an interactive theory of development which considers developmental progression or growth to be determined both by the person's present development stage and by the environment he experiences (Harvey, Hunt & Schroder, 1961).

The matched environments for development, that is, the one most likely to produce stage-specific development in Figure 1 were derived by simply asking the question, "Given the conceptual work required to progress from one stage to the next, what is the environment most likely to facilitate such work?"

Insert Figure 2 about here

For example, the Stage A person, in order to progress to Stage B, must understand and incorporate the cultural rules. Since rules are learned best when the rules are clear, the ideal environment to foster development to Stage B is therefore a clear, consistent, highly structured one. Following similar logic, the ideal environment for progression to Stage C is moderately structured, but encourages self-expression and autonomy. These environments are summarized in the left side of Figure 2.

Figure 2 also indicates the matched contemporaneous environments. The basic dimension of environmental variation is <u>degree of structure</u>. In high structure, the environment is largely determined by the teacher, while the student himself has little responsibility for what happens in the environment. In low structure, by contrast, the student is at least as important in determining the environment as the teacher. Given the characteristics of low CL persons (categorical, dependent on external standards and incapable of generating their own concepts), one predicts that they will profit more from highly structured approaches.

Figure 2

Conceptual Level matching models

Developmental		Contemporaneous		
Developmental Stage	Matched Environment for Development	Conceptual Level	Learning Style	Matched Environment
Stage C Independent	Unstructured with emphasis on autonomy	High	Capable of functioning in variety of structures	Either low or high structure depending on preference
Stage B Dependent	Encourage self-expression within moderate structure	Low	Need moderate structure	Moderate structure
Stage A Unsocialized	Accepting but firm; highly structured	Very Low	Need high structure	High structure

Given the characteristics of high CL learners (capable of generating new concepts, having internal standards to a higher degree, and being capable of taking on different views), it is predicted that they will either profit more from low structured approaches or be unaffected by the degree of structure. Thus, the heart of the CL matching model is a generally inverse relation between CL and degree of structure: "Low CL learners profiting more from high structure and high CL learners profiting more from low structure, or in some cases, being less affected by variation in structure."(Hunt, 1971, p. 44.)

This matching principle is certainly not new. Good teachers have probably always known that students differ in how they learn; some by listening to the teacher, some by discussion, some by working on their own, etc. Therefore, in educational practice we use the term, learning style to describe the student's CL, and define it in terms of how much structure a student needs to learn best (Figure 2.). This shift in terminology from CL to learning style focusses the emphasis appropriately on specifying educational environments in terms of their degree of structure, a necessary step in applying the matching model.

Before turning to this issue, a few questions about learning style remain. First, as Figures 1 and 2 indicate, learning style is not considered a fixed, unchanging characteristic, and any application of learning style to meet student needs should take account of developmental goals, i.e. helping each student to become more independent

and to work effectively in a wider variety of environments. A student's present learning style therefore not only specifies the matched environment for optimizing present learning, but also charts the goal for development, i.e., change in learning style becomes an objective in itself.

Second, what is the relation of learning style to ability? Like any cognitive characteristic, learning style bears some relation to verbal ability; however, for students of junior high school age and above, learning style can be distinguished from ability. Learning style describes <u>how</u> a student learns, not how much or how well he has learned. High CL students (those with a learning style which permits learning in a variety of structures) are likely to be fairly high in ability; however, low CL students (who require a structured learning environment) are likely to vary considerably in ability. Further, the learning style-ability relation is lower among college students than among high school students, and less for high school students than for junior high students. The important point to be discussed later is to make the distinction clear in the mind of the teacher who is using the idea. Even though ability and learning style are correlated, they can be distinguished as will be shown, and this difference, rather than the similarity, requires emphasis because of the tendency of teachers (and all the rest of us) to think of students only in terms of ability.

Third, the question of generality of learning style; do students have the same learning style in different subjects? This

question is sufficiently difficult in itself, but it is complicated by the variation in the disciplines themselves. For the present concern of social studies, we will assume that learning style applies to this domain, and cite supporting evidence. In the future, we will need to make more subject-specific assessment of learning style, but for now (primarily because teachers working with students of different general learning styles find this helpful in various subjects), we continue to consider a student's general learning style.

How teaching strategies vary in degree of structure

To coordinate models of teaching with the CL matching model requires that models of teaching be described in terms of their degree of structure, an analysis which Joyce and Weil (1972) have provided as summarized in Table 1.

Insert Table 1 about here

Table 1 provides the basis for specific translation of the matching principle in that students with high needs for structure (low CL) should learn better with models which are high in structure; high CL students should show less variation in their response to models varying in structure, but generally should benefit more from models low in structure. Before considering specific evidence for the principle, it should be noted that educational environments larger than a teaching strategy may be characterized in terms of their degree of structure. For example, Upward Bound

Table 1

Classification of Models by Amount of Structure

	Name of Model	Amount of Structure
1.	Inductive (Taba)	Moderate
2.	Inquiry Training (Suchman)	High
3.	Science Inquiry Model (Schwab)	Moderate
4.	Jurisprudential Teaching (Oliver and Shaver)	High
5.	Concept Attainment (Bruner)	Moderate
6.	Developmental (Piaget)	Can vary from low to high (usually high)
7.	Advance Organizer (Ausubel)	High
8.	Group Investigation (Thelen)	Low
9.	Social Inquiry (Massialas and Cox)	Moderate
10.	Laboratory Method (National Training Laboratory)	The T-Group is exceedingly low structure while the exercises can be moderately structured
11.	Non-Directive Teaching (Rogers)	Low
12.	Classroom Meeting (Glaser)	Moderate
13.	Synectic (Gordon)	Moderate
14.	Awareness Training (Shutz)	Moderate to Low
15.	Conceptual Systems (Hunt)	Varies from Low to High
16.	Operant Conditioning (Skinner)	High

(From Joyce and Weil, 1972, p. 305).

summer programs have been characterized in terms of degree of structure (Hunt & Hardt, 1967) and most recently, alternative high schools, systematically designed to vary in their degree of structure, are operating (Hunt, 1972) to serve students with different learning styles.

Construct validity evidence for CL matching model

Experiments designed to test the matching principle have usually consisted of identifying high or low CL students who are assigned to one of the experimental learning conditions which are designed to vary in terms of their degree of structure to determine whether the differential effects are as predicted. In almost all studies, student ability is controlled either through equating groups or through statistical correction. The effect of a discovery learning approach (low structure) was found to be differentially effective as predicted (McLachlan & Hunt, in press): for low CL students, learning was significantly better with a lecture than with a discovery approach while high CL students performed well in both conditions. Whether a rule is presented before an example (high structure) or afterward (low structure) also produced differential effects (Tomlinson & Hunt, 1971): low CL students learned better with the rule-example (high structure) while CL students performed fairly well in all conditions (although their performance was poorest in the high structure condition). In a recent study investigating different approaches to increasing student's understanding of the people in another country (Salyachivin, 1972), low CL students were found to be more susceptible to primacy effect, i.e., when two kinds of

information were presented, they were most affected by whatever they experienced first.

One of the models of teaching in Table 1, sensitivity training was found to have predicted differential effects on teacher trainees (Heck, 1971): high CL trainees showed greater improvement in the adaptability of their teaching under sensitivity (low structure) training while low CL trainees improved more with the Human Development Institute (high structure) approach. At the level of educational programs, the structure of summer Upward Bound programs was found to have a differential effect as predicted (Hunt & Hardt, 1967): when programs were defined as matched (structured program with predominantly low CL students and flexible programs with predominantly high CL students) or mismatched (flexible programs with predominantly low CL students and structured programs with predominantly high CL students), it was found that for four of the seven measures (attitude to summer program, motivation for college, possibility of college graduation, and interpersonal flexibility), students in matched programs showed significantly greater positive change than in mismatched programs, and for two of the remaining measures (internal control and self-evaluated intelligence), there was a borderline tendency for students in matched programs to change more.

More controlled experiments of the kind described based on models of teaching in Table 1 are needed before it can be used as a specific

blueprint to guide differential educational programs, but there appears to be sufficient evidence to justify application of the model.

These studies reviewed support the contemporaneous matching principle, but what about procedure for modifying learning style? One of my OISE colleagues, Joyce Noy, has begun using biographical information systems, originally designed to index the effects of a student-directed learning (Noy & Hunt, 1972), to train students in problem solving, e.g. searching in relation to hypotheses, search strategy, etc. She is using one of the systems containing information on Sigmund Freud as a training system to note its effect when students work with a second system containing information about the life of Ernest Hemingway. One of the initially surprising findings was that high CL students before training searched fewer (but more relevant) topics than low CL students, and that a major effect of training was to decrease the number of topics searched by low CL students. In effect, they seem to use a strategy of asking many unrelated questions rather than organizing their search strategy.

What about matching the student to the teacher rather than to the teaching method? Part of the answer depends on the range of strategies available to a teacher; as Bruce Joyce has suggested, teachers should be encouraged to learn a wide varieties of teaching strategies so that they can modulate to a wide range of students. However, some teachers may have only one or a very few strategies which are preferred in which case such available teacher strategies should be considered simply as available alternative resources which may or may not exist in the same

teacher. It seems reasonable to think that similarity in CL between teacher and student constitutes a match, and there is some evidence in psychotherapy (McLachlan, in press) that patients assigned to therapists of similar CL benefit more than those assigned to therapists with a different CL. However, in educational practice, such "personality matching" raises many practical problems, not the least of which is to imply a static, restricted role for the teacher.

It is true, however, that the matching is not entirely a one-way process in that student CL affects a teacher's behavior. For example, in an investigation of teachers varying in CL with students varying in CL, Rathbone (1970) found, in agreement with earlier work (Hunt & Joyce, 1967), that high CL teachers were more interdependent in their teaching method than low CL teachers. However, both high and low CL teachers were influenced by student CL with both groups teaching more interdependently to the high CL students than the low CL students. Therefore, any implementation of matching should take account of such student effects.

Issues in implementation of matching model

Learning style assessment

Paragraph Completion Method. In all of the experiments described, CL was assessed by means of a Paragraph Completion Method (Hunt, 1971). Students are asked to write a response to each of six topics, e.g. "What I think about rules...". Each response is assigned a numerical score ranging from 0 to 3 in increasing CL (a score of 0 is similar to A in

Figure 1; 1 approximately to B; and 3 to Stage C). CL score is the aggregate of these six scores, and scores may range from .5 to 3.0. In practice, students with scores of 1.5 and below are considered to need considerable structure, those with scores from 1.5 to 1.9 moderate structure, and those with scores of 2.0 and above able to function with a variety of structures. The Paragraph Completion Method has been used with thousands of students, mostly from 12-18, over the past 15 years so that considerable construct validity, correlates, and normative evidence is available (Hunt, 1971). On the negative side, the method relies at least partly on verbal facility, and scoring is relatively difficult and time consuming. For these reasons and also because students are being offered more options requiring self-matching, it becomes important to consider how students can learn to assess their own learning styles.

Student self-assessment. To assess his own learning style, a student needs an understanding of what learning style means and some relevant information about himself to use in his assessment. If time and resources are available, a student can systematically experience a variety of learning environments which vary in their structure, note how well he learns, and how he feels about such learning. Imagine for example, a student sampling each of the model of teaching in Table 1. We have explored using a more limited variety of instructional modes -- lecture, discovery, and discovery -- with encouraging results. One exploratory study indicated that 14 per cent of the low CL students preferred the discovery approach while 41 per cent of the high CL students preferred the discovery mode. These findings are in keeping with the

McLachlan-Hunt study described earlier, as are those in a replication of this study (Robertson, in progress)which investigated student reactions to a lecture vs. a less structured approach (either discussion or discovery). As predicted, low CL students judged the lecture more valuable for learning than did the high CL students. However, when asked for preference for instructional modes, there was no difference in CL groups. This finding epitomizes the major difficulty in student self-assessment: distinguishing between the learning environment required and the one preferred. High CL students can choose on the basis of their preference since they are presumably capable of learning in a variety of structures. However, a low CL student who requires a structured educational environment may not select it as the one he prefers.

Teacher assessment of learning style. As noted, many teachers are intuitively aware of different learning styles among their students and have been adapting instruction to these differences without necessarily explicating such student differences. Therefore, some teachers should be able to assess learning style. Teachers, like students, need to understand the idea (especially its distinction from ability) and obtain relevant information for making judgments. We have encouraged teachers to apply the "environmental cafeteria" informally and note how well students learn under different degrees of structure. It is essential that teachers make these assessments in relation to a learning environment of a specific structure; therefore, they need some awareness of the kind of variation in Table 1. Although it may seem easy, we have found

that many teachers have great difficulty in distinguishing learning style from ability, and this is especially true of the high verbal-low CL student whom they are likely to regard as independent. However, training teachers to assess learning style systematically seems very worthwhile.

Assessment of available teaching strategies

A closely related problem is how to assess available resources for providing a variety of teaching strategies within a school or within a teaching team. Bruce Joyce has described some procedures for assessing how effectively a teacher can radiate a specific model of teaching or a variety of them. However, just as it is important to involve students in the assessment of their learning style, teachers should assume as much responsibility as possible in assessing their available repertory of teaching strategies. This is not an easy matter, but a mirror image of the environmental cafeteria in which the teacher is asked to teach the same lesson in a variety of modes described in Table 1 would seem most appropriate.

Educational arrangements to implement matching

To state that a particular student requires a certain amount of structure in his learning environment does not indicate how to provide that environment; in short, the matching principle describes what a student needs, but not precisely what educational arrangement is best suited to meet that need.Several educational arrangements to implement

matching will be described,and which one is most effective will depend to a large extent on the specific situation and the variety of educational environments available.

Each of the educational arrangements is a way of organizing resources so that students are more likely to experience more appropriate alternatives. Although they may seem at first to be limiting the educational environments received by students, programs based on matching often have the unexpected effect of increasing the diversity of alternatives. They clearly increase the sensitivity of the teacher and administrator to the needs of the student. Thus, we believe that how the school staff thinks about its students is infinitely more important than the particular educational arrangement. Put another way, the success of alternative secondary schools or homogeneous grouping will depend almost entirely on the staff and their ways of thinking rather than on the arrangement itself. No arrangement can succeed unless the staff think in terms of student needs, and how to meet them.

Matching within class

If a teacher has learning style information about his students, he can make adaptations within the classroom. This can be accomplished either more formally by working with small learning style groups during certain times or informally by using the information to adapt to specific students, e.g. planning the pace of an independent study project.

Matching between classes: homogeneous grouping

Grouping together students with similar learning style is one of the most obvious methods for implementing matching ideas, and this procedure has been used in several schools during the past few years. Since learning style is linked to what teaching method is used, the value of grouping is clear. A teacher who works with a group of students who require a similar approach should be more effective and efficient. Learning style grouping has been used in open elementary schools with one teacher assigned to each group and in junior high school team teaching where each teacher works with all learning style groups (Hunt, Greenwood, Brill, & Deneika, 1972). The latter arrangement, though more demanding, gives teachers a much better idea of the idea of learning style.

Grouping students inevitably raises questions about its resting effects on student growth. First, the students are not initially "all alike" because of their similarity in learning style; there will be a wide variation in ability, activity, passivity, and interest, so that there will be a diversity of peer stimulation available. Second, if a student's learning style in a particular subject differs from the others, then the teacher can be more aware of this difference, and spend more time working with him than would be possible in a class of students with the entire range of learning styles. Third, as indicated, the student's present learning style can itself help define the long-term goal of growth and development.

Matching between schools: alternative school environments

Since the structure of an entire school may be defined in terms of a degree of structure ranging from high structure (expectations are clear, rules are explicit, and students receive considerable supervision) to relatively low structure, then the matching idea can be implemented at the school level. (Hunt, 1972). In Ontario, the York County Board of Education has just begun an educational arrangement in which two high schools in a common attendance area are "twinned", and students permitted to choose which one to attend. Aurora High School, the more structured alternative is designed to serve the following types of students:

> "1) Those who have demonstrated through previous performance that they learn better and appear happier and more secure in an atmosphere where both academic and behavioural requirements are clearly understood by all students and staff and where regular reports on progress are provided in specific terms.
>
> 2) Those who are inherently capable of coping with any educational climate, but who prefer an orderly style of learning and recognize the place of the knowledgable and experienced teacher in providing this style" (York County Board of Education minutes, 20 December 1971).

Aurora High School, therefore, is specifically designed for low CL students and for high CL students who prefer a structured learning environment. The other school, Dr. G. W. Williams Secondary School, is less structured. This is the first year of the twinning project, but some indication of how this matching project is getting underway is indicated by Figure 3

Insert Figure 3 about here

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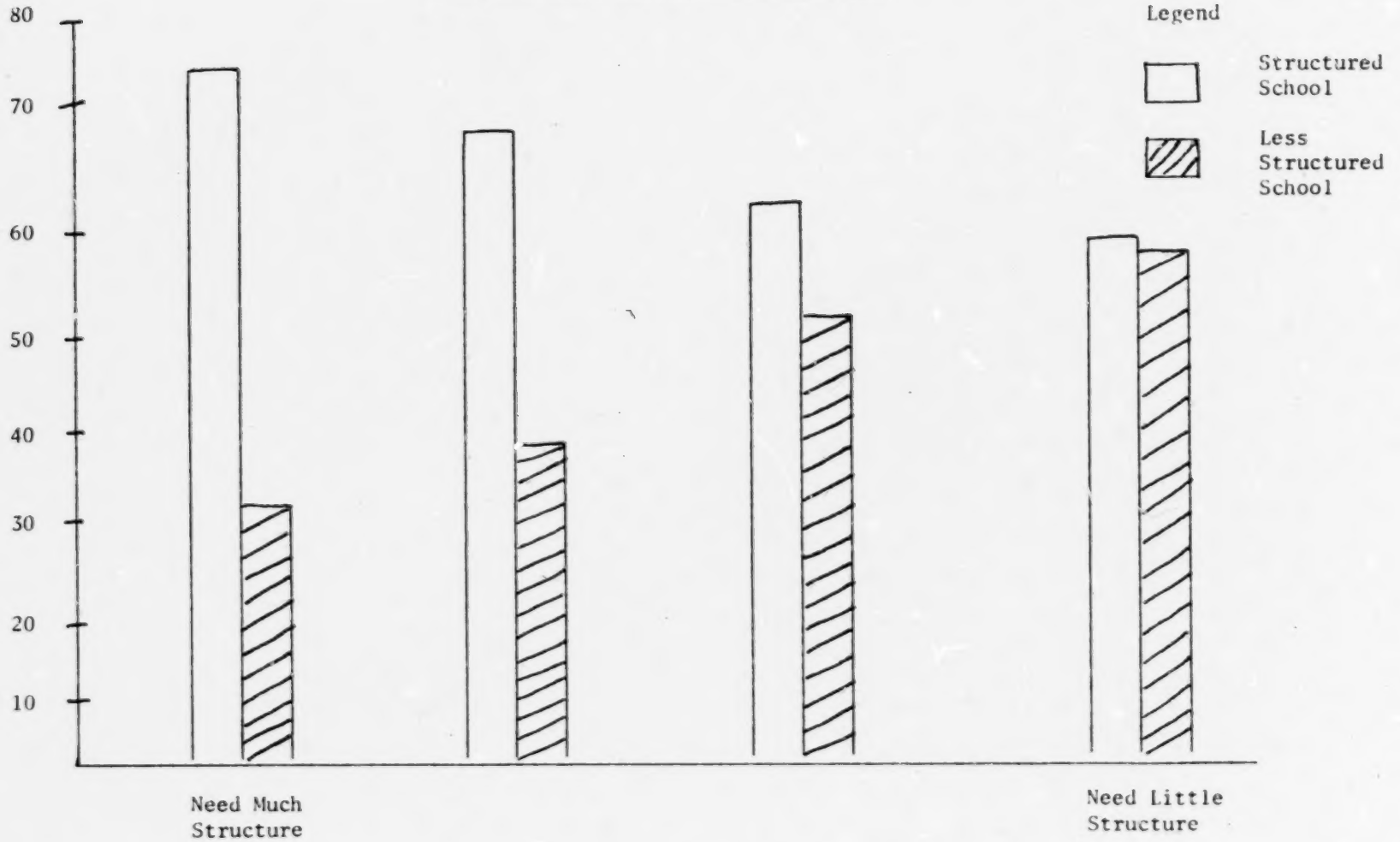
which shows the school choice by learning style or CL. The higher proportion of low CL students selecting the structured school is in keeping with the matching principle.

Figure 3

CHOICE OF SCHOOL AND LEARNING STYLE



Student Learning Style

(Conceptual Level)

Just as we observed that homogeneous classroom grouping has the unexpected desirable effect of sensitizing teachers to within - class differences in student needs, the same thing happens when students attend a school on the basis of their learning style. Although the twinned schools are ideally intended to serve students with a particular learning style, in practice each school will always serve students with a wide variety of learning styles. As the school staff become more sensitive to this variety in learning style within the school, a variety of instructional approaches within the classroom can be designed to meet these student needs.

Conclusion

This last set of observations about the unexpected effects of matching programs in which the school staff involved in these programs become more sensitive to student needs in general cannot be overemphasized. We conclude by noting that learning style is only one of many "accessibility characteristics" (Hunt, 1971) which can be matched to variation in educational approach. For example, students obviously vary in terms of preferred sensory orientation, e.g. visual, auditory, which can be modulated to the appropriate modality. Learning style, therefore, is only one example of matching educational environments to student characteristics.

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